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AF9412N

N-Channel 30-V (D-S) MOSFET

■ Features

-Low $r_{DS(on)}$ Provides Higher Efficiency and Extends Battery Life
-Miniature SO-8 Surface Mount Package Saves Board Space
-High power and current handling capability
-Low side high current DC-DC Converter applications

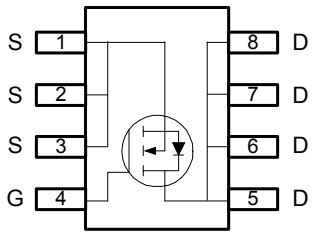
■ General Description

These miniature surface mount MOSFETs utilize High Cell Density process. Low $r_{DS(on)}$ assures minimal power loss and conserves energy, making this device ideal for using in the power management circuitry. Typical applications are PWM DC-DC converters, power management in portable and battery-powered products such as computers, printers, battery chargers, telecommunication power systems, and telephone power systems.

■ Product Summary

V_{DS} (V)	$r_{DS(on)}$ (mΩ)	I_D (A)
30	22@V_{GS}=10V	9.0
	36@V_{GS}=4.5V	7.0

■ Pin Assignments

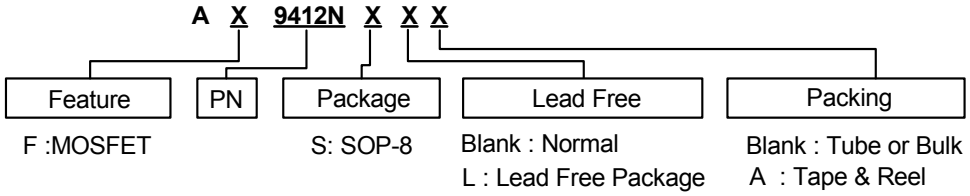


SOP-8

■ Pin Descriptions

Pin Name	Description
S	Source
G	Gate
D	Drain

■ Ordering information



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■ Absolute Maximum Ratings (T_A=25ºC unless otherwise noted)

Symbol	Parameter		Rating	Units
V_{DS}	Drain-Source Voltage		30	V
V_{GS}	Gate-Source Voltage		±20	V
I_D	Continuous Drain Current **(Note 1)**	T_A=25ºC	9.4	A
		T_A=70ºC	7.4	
I_{DM}	Pulsed Drain Current **(Note 2)**		30	A
I_S	Continuous Source Current (Diode Conduction) **(Note 1)**		1.6	A
P_D	Power Dissipation **(Note 1)**	T_A=25ºC	3.1	W
		T_A=70ºC	2.2	
T_J, T_{STG}	Operating Junction and Storage Temperature Range		-55 to 150	ºC

■ Thermal Resistance Ratings

Symbol	Parameter		Maximum	Units
$R_{\theta JC}$	Maximum Junction-to-Case **(Note 1)**	t ≤ 5 sec	25	ºC/W
$R_{\theta JA}$	Maximum Junction-to-Ambient **(Note 1)**	t ≤ 5 sec	40	

Note 1: surface Mounted on 1"x 1" FR4 Board.
Note 2: Pulse width limited by maximum junction temperature

■ Specifications (T_A=25ºC unless otherwise noted)

Symbol	Parameter	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Static						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250uA	30	-	-	V
$V_{GS(th)}$	Gate-Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	1	1.95	3.0	V
I_{GSS}	Gate-Body Leakage	V_{DS}=0V, V_{GS}=20V	-	-	±100	nA
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=24V, V_{GS}=0V	-	-	1	uA
		V_{DS}=24V, V_{GS}=0V, T_J=55ºC	-	-	25	
$I_{D(on)}$	On-State Drain Current **(Note 3)**	V_{DS}=5V, V_{GS}=10V	20	-	-	A
$r_{DS(on)}$	Drain-Source On-Resistance **(Note 3)**	V_{GS}=10V, I_D=9.2A	-	17	22	mΩ
		V_{GS}=4.5V, I_D=8A	-	29	36	
		V_{GS}=10V, I_D=9.2A, T_J=55ºC	-	20	27	
g_{fs}	Forward Transconductance **(Note 3)**	V_{DS}=15V, I_D=9.2A	-	40	-	S
V_{SD}	Diode Forward Voltage	I_S=2.3A, V_{GS}=0V	-	0.7	1.1	V
Dynamic **(Note 4)**						
Q_g	Total Gate Charge	V_{DS}=15V, V_{GS}=4.5V, I_D=7A	-	4.7	8	nC
Q_{gs}	Gate-Source Charge		-	1.7	-	
Q_{gd}	Gate-Drain Charge		-	1.4	-	
Switching						
$t_{d(on)}$	Turn-On Delay Time	V_{DD}=25V, R_L=25Ω, I_D=1A, V_{GEN}=10V	-	16	21	nS
t_r	Rise Time		-	5	10	
$t_{d(off)}$	Turn-Off Delay Time		-	23	37	
t_f	Fall-Time		-	3	6	
t_{rr}	Source-Drain Reverse Recovery Time	I_F=2.3A, Di/Dt=100A/uS	-	41	80	nS

Note 3: Pulse test: PW ≤ 300us duty cycle ≤ 2%.
Note 4: Guaranteed by design, not subject to production testing.

■ Typical Performance Characteristics

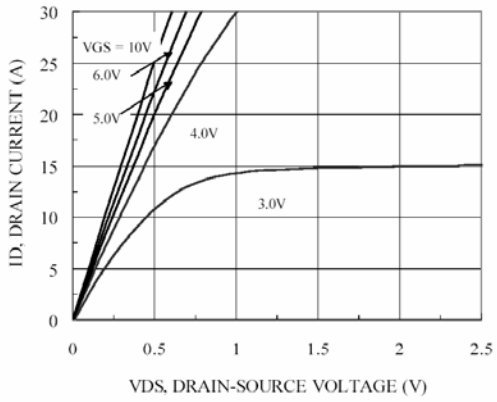


Figure 1. On-Region Characteristics

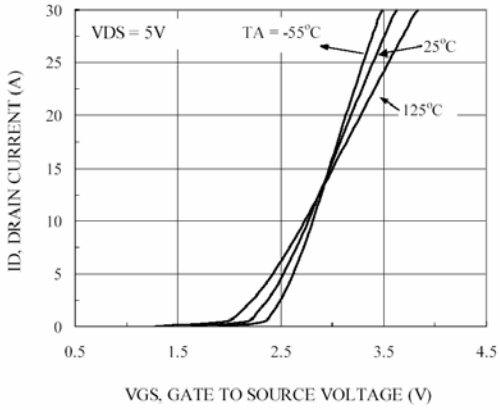


Figure 2. Body Diode Forward Voltage Variation with Source Current and Temperature

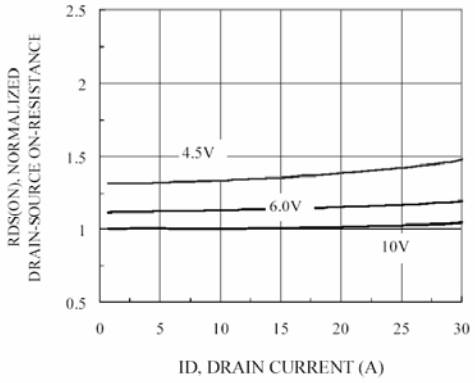


Figure 3. On Resistance Vs Vgs Voltage

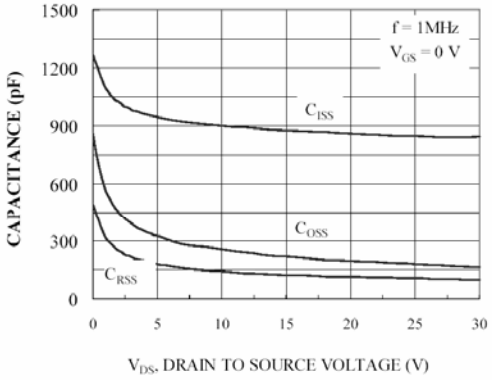


Figure 4. Capacitance Characteristics

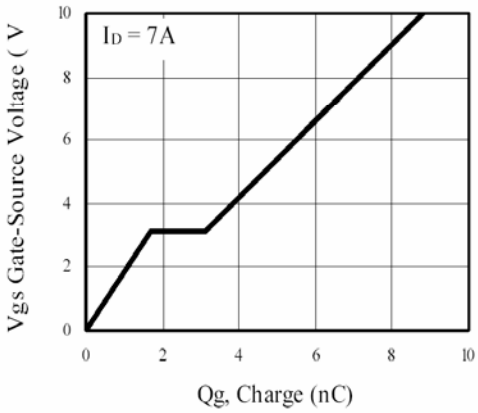


Figure 5. Gate Charge Characteristics

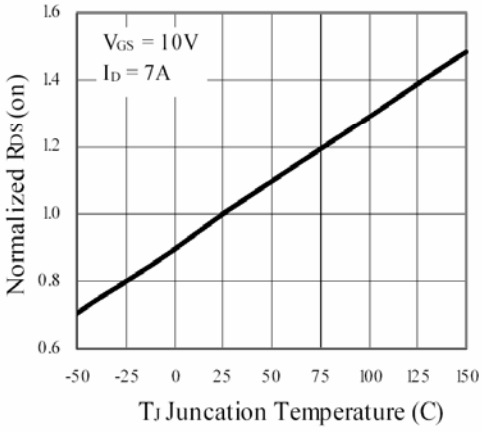


Figure 6. On-Resistance Variation with Temperature

■ Typical Performance Characteristics (Continued)

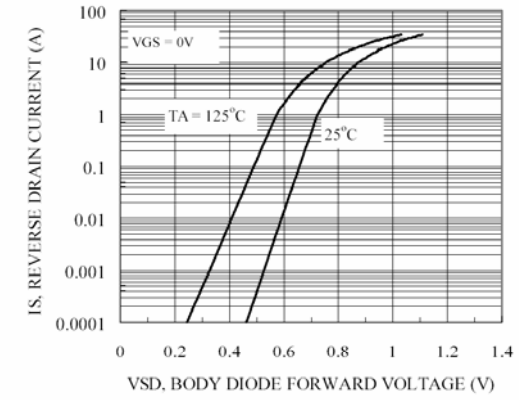


Figure 7. Transfer Characteristics

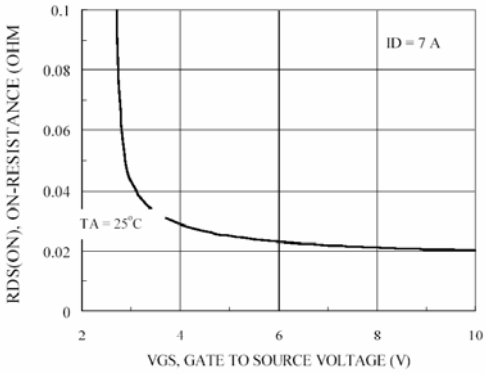


Figure 8. On-Resistance with Gate to Source Voltage

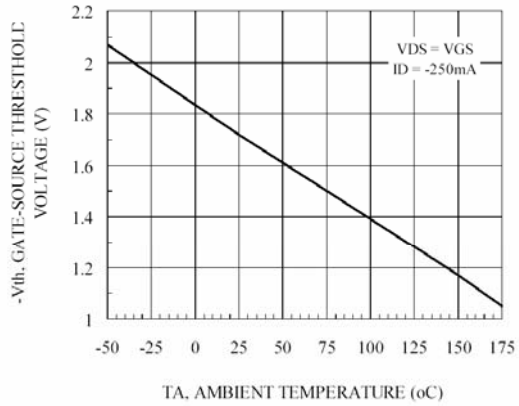


Figure 9. Vth Gate to Source Voltage Vs Temperature

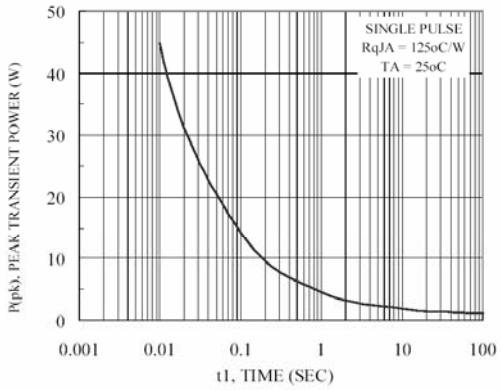


Figure 10. Single Pulse Maximum Power Dissipation

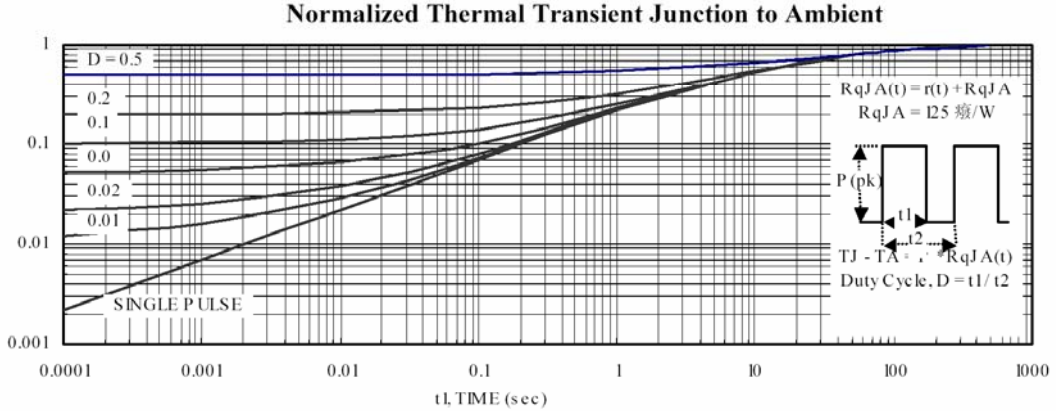
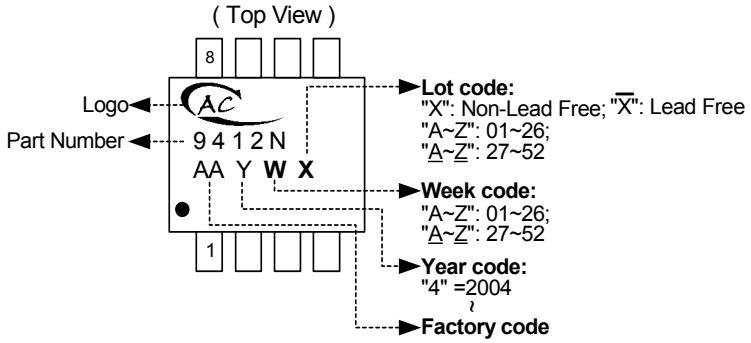


Figure 11. Transient Thermal Response Curve

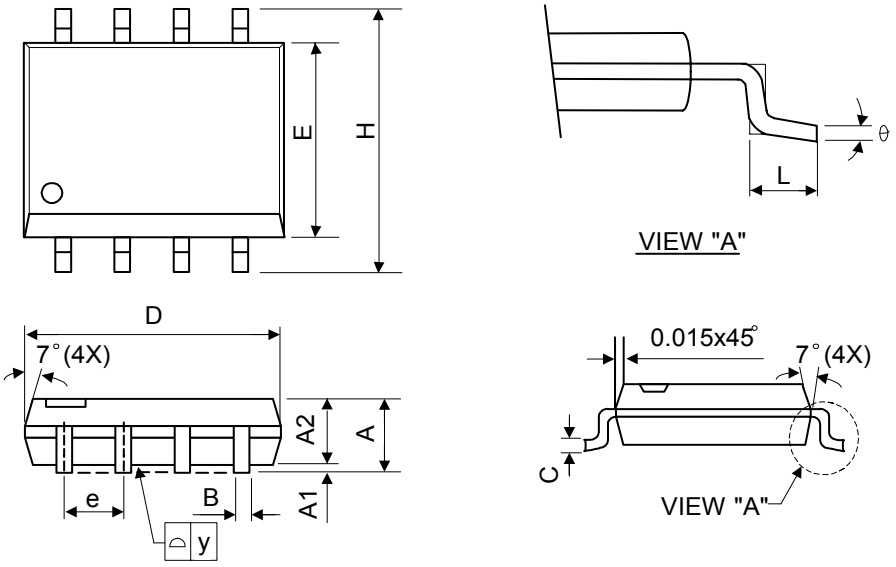
■ Marking Information

SOP-8L



■ Package Information

Package Type: SOP-8L



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	1.40	1.60	1.75	0.055	0.063	0.069
A1	0.10	-	0.25	0.040	-	0.100
A2	1.30	1.45	1.50	0.051	0.057	0.059
B	0.33	0.41	0.51	0.013	0.016	0.020
C	0.19	0.20	0.25	0.0075	0.008	0.010
D	4.80	5.05	5.30	0.189	0.199	0.209
E	3.70	3.90	4.10	0.146	0.154	0.161
e	-	1.27	-	-	0.050	-
H	5.79	5.99	6.20	0.228	0.236	0.244
L	0.38	0.71	1.27	0.015	0.028	0.050
y	-	-	0.10	-	-	0.004
θ	0^{O}	-	8^{O}	0^{O}	-	8^{O}